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Evacuation of Persons with Cognitive Disability

Are we ignoring the most vulnerable in our communities?

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According to Proulx, G (2001) disabled people who are residents of care homes are especially at risk during a fire incident. The Equality Act (2010) ensures access for all is a requirement in law however safe egress for all is not as well documented. This paper will examine cognitive disability and how its presence may impact on evacuation from the built environment. It will also consider whether the current thinking on evacuation of disabled persons is adequate, and whether the legislation in place takes full cognisance of the challenges faced by disabled people in an emergency situation.

Evacuation of disabled persons was discussed by Shields, Boyce & McConnell (2009) who conclude that the terms used to categorise individuals and their level of disability, and therefore their ability to evacuate efficiently in a fire, is not suitable to be used in fire engineered performance based design. Methods should be developed to allow an enhanced more realistic evaluation of the capabilities of persons with disability to enable them to evacuate safely from a fire emergency.

In general, people with cognitive disability, and their corresponding needs within the built environment appear to have been grouped together with physically disabled people within regulations from around the world.

Evacuation of persons with disability is well researched and the rights of disabled people are enshrined in laws both in the UK and worldwide, such as the Equality Act (2010) in the UK and the Convention on the Rights of Persons with Disabilities (2006), to protect the rights of disabled individuals and their right to accessibility to areas within our communities including offices, shops, schools, transportation and hospitals. However, the information on evacuation from premises is not so clear for persons with cognitive disabilities. On initial review of the available documents regarding evacuation of persons with cognitive disabilities in Scotland it appears that very little guidance specific to cognitive disabilities is available. Where cognitive disability is recognised, such as within the Scottish and UK Governments in The Evacuation of Disabled Persons from Buildings (2007), it appears to be generic and based on the guidance for evacuation of physically disabled people who may have different requirements for successful evacuation of a building.

Evacuation

The Society of Fire Protection Engineers Handbook of Fire Protection Engineering (2016) states that human behaviour in a fire incident should be central to any project where life safety is the ultimate goal, and that understanding human responses to fire is crucial to achieving a better performance based guidance system. It also considers the research on human behaviour and evacuations, and discusses how retrospective case studies of notable building fires have left the fire engineering industry with partial theories about human behaviour in fire incidents.

According to Canter (1990) major fires disasters are still occurring even with modern day engineering systems in place such as a greater understanding of construction materials and how they react in fire and the development of more technologically advanced systems such as water mist suppression systems, addressable fire alarms and air sampling systems to enable very early detection of the products of combustion and alert the occupants to the location of a fire incident. There has also been a shift in policy with how the regulatory authorities consider design of building from prescriptive guidance, which was rooted in historical theory, to a more performance based design where the onus is placed on the design team to demonstrate the design they are proposing is safe and fit for the intended purpose while still meeting the functional intent of the guidance.

The incidences of fire are reducing every year according to The Scottish Fire & Rescue Service Fire Statistics (2015) who report a downward trend of fire incidents over the last ten years. Although fire is a rare occurrence the risk of being involved or injured in a fire incident is greater in a residential setting, with the highest number of fires and 87% of fire casualties occurring in residential dwellings over the last ten years. The number of disabled people living in a domestic dwelling has increased with the shift from large scale care facilities to smaller group homes or individual assisted living within the community (Knapp, 1992). These findings may suggest that requirements for the safety of vulnerable people within domestic dwellings should be looked at seriously.

A component of evacuation is the speed at which the occupants inside the building can exit the building. According to Kholshevnikov and Samoshin (2008) the movement speed of pedestrians is a product of their physical ability and how many people are moving together, however there is no mention regarding how cognitive ability may affect their speed of exiting the building and only a brief mention of their "emotional" state at the end of the paper. Some people with cognitive disability may also suffer from a physical disability and the requirement for specific assistance or equipment will highlight the need for a Personal Evacuation Plan. However, in many cases it may be impossible to distinguish a person with a cognitive disability from any other and in these circumstances the need for a personal evacuation plan may not be so obvious (Davis, 2002). There is also the possibility that occupants of the building will not be aware that they have a cognitive disability which may only present itself and cause difficulty during an emergency incident.

Research on evacuation of persons with a disability from the built environment is discussed by Charters and Crowder (2013) where they discuss about how the nature and severity of the disability is a factor in evacuation, and that being able to quantify

the time required to evacuate is a complex task. The evacuation of persons with disability can be challenging and the abilities of the evacuees, whether it is a cognitive or physical limitations can make the process protracted and problematic. This is where the role of staff and the management level of the building can play a part in a successful outcome in the event of a fire incident. One method of preparing for evacuation can be through the preparation of a Personal Emergency Evacuation Plan (PEEP).

Defining Disability

To enable designers to design for the disabled population an understanding of the target population is essential.

According to The Equality Act (2010) a person has a disability if: -

(a) *"They have a physical or mental impairment, and*
(b) *The impairment has a substantial and long term adverse effect on their ability to carry out normal day-to-day activities"*.

The Equality Act (2010) states that it is the responsibility of an organisation to make reasonable adjustments to their processes and practices to ensure that disabled people are not disadvantaged. Also where the physical layout of a building causes a disabled person to be put at a substantial disadvantage compared to an able bodied person they are required to take reasonable steps to resolve this. Organisations are required to provide any auxiliary aids required to remove substantial disadvantage which may exist, to enable a disabled person to overcome the barrier.

The Equality Act (2010) goes on to say that disability can be the result of many impairments, including developmental conditions such as dyslexia, dyspraxia and autism spectrum disorders (ASD). These cognitive disabilities can be progressive and impairments can develop over time due to getting old such as in motor neuron disease and dementia including Parkinson's disease and Alzheimer's.

According to Boyce et al (1999) an estimated 2.8% of the mobile disabled population of Northern Ireland have an intellectual functioning disability. The authors go on to explain that given the similarities between the Northern Ireland statistics and the statistics for Great Britain this estimate may reflect the situation throughout the United Kingdom.

Defining Cognitive Disability

A Cognitive Disability or, as the American Psychiatric Association (2013) define it, a *"Mental Disorder"* is

"A syndrome characterised by clinically significant disturbance in an individual's cognition, emotion regulation, or behaviour that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental function. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities"

Looking at the definition given for mental disorders it is possible to see the issues which may arise in emergency situations with persons who have been diagnosed with these disabilities. They may face difficulties with the cues given in an emergency and not grasp the seriousness of the situation, it may cause them to become stressed and regress deeper into their condition or become violent towards the people tasked with their care or other service users if it is within a care facility. Mental disorders as defined by the American Psychiatric Association (2013) can be diverse as is shown in the following list:

- Bi-Polar Disorder
- Schizophrenia
- Autism
- Dyspraxia
- Alzheimer's Disease
- Dyslexia
- Parkinson's Disease

This list is not exhaustive and within each of the known cognitive disabilities there are often numerous wide-ranging diagnoses which can present in many ways. It is clear that safe evacuation of the most vulnerable people within our society is of paramount importance and that a one size fits all solution is not capable of meeting these life safety goals.

<u>Movement Speeds of the Disabled Population</u>

Boyce, Shields & Silcock (1999) presented research on the characterisation of disabled people during evacuation of the built environment. Their study focussed on the movement speed of disabled people with various levels of disability. It did discuss persons with cognitive disability but did not sample anyone from that group

or measure their movement speeds. The study did advance the understanding of the challenges faced by the physically disabled population, and provided the fire engineering community with valuable tools to enable a better characterisation of disabled people in buildings.

The author was unable to find any substantial research on the characterisation of persons with cognitive disability with regard to travel speeds or the behavioural characteristics associated with cognitive disability.

Conclusions

This study examined the considerable challenges associated with evacuation of persons with cognitive disability, and found a lack of published evidence pre-existing in this field. The literature which was available focused on the evacuation and movement speeds of physically disabled persons rather than those with a cognitive impairment.

To enable a positive outcome in an emergency situation mechanisms will have to be developed to further understand the limitations of cognitively disabled persons when faced with visual and auditory cues along with the products of combustion.

The function within the software available to fire engineers to estimate evacuation times from buildings, do not appear to represent the behavioural characteristics of persons with cognitive disability. Considering the increase in the ageing population and trends toward performance based design, improvements should be made to the software to ensure the designs are robust enough to accommodate the needs of all occupants within the built environment and ensure life safety goals are achieved.

Recommendation

It is the recommendation of this paper that further research should be carried out within the target population of persons with cognitive disability to gain a greater understanding of their reaction to external stimulus such as the electronic sounds often found in modern day fire alarm systems, also an advanced study on a larger

cross section should be carried out to make estimation of the movement speeds of these groups more accurate.
This would enable a larger amount of data to be collected which could be utilised within evacuation modelling software.

The need for further understanding and research into the behavioural elements of evacuation are required to fully understand the numerous possibilities of evacuation of persons with cognitive disability. The use of computer evacuation modelling software in performance based design of buildings must take into consideration the behaviour of not only able bodied people but those with disabilities both physical and cognitive and also the un-seen disabilities which up till the present have been neglected when computer models are used to justify deviation from the available guidance.

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